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# **The Onchocerciasis Control Program in West Africa**

## **A Long-term Commitment to Success**

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Among African health programs, this program to control "riverblindness" is an exceptional recent success story. Here are some lessons from it.

This paper — a joint product of the Population, Health, and Nutrition Division, Population, Health, and Human Resources Department and the Health Services Department — is part of a larger study undertaken in PRE of African Health Policy. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Otilia Nadora, room S6-065, extension 31091 (14 pages).

Onchocerciasis is a devastating African parasitical disease that causes severe debilitation and intense itching. By the time its victims are in their late twenties, they experience impaired vision, often blindness. River villages are particularly afflicted because the blackflies which transmit the worm parasite that causes the disease breed in rivers — hence the colloquial “riverblindness.”

The connection between life by the river and blinding onchocerciasis led to the virtual abandonment of many fertile river valleys, so potentially productive lands lay idle for many years. Yet millions continued to succumb to the disease until the onchocerciasis control program, a large multidonor-supported effort initiated in 1973 at the instigation of Robert McNamara, then head of the World Bank.

Today, 95 percent of the original seven-country area is virtually free of the disease, and previously deserted lands are being resettled and cultivated, increasing agricultural production.

From the beginning, the program maintained a limited, specific objective: to control onchocerciasis in a clearly delineated area in the savannah zones of West Africa. The operational focus was to interrupt transmission of the disease and eventually eliminate the parasite in all the human population. The only acceptable approach was effective control of the disease-transmitting blackfly. The strategy was to focus on destroying blackfly larvae located in fast-flowing rivers, which could easily be targeted with aerial spraying.

The main challenges of the program have been to combat the reinvasion of controlled areas by blackflies, to manage multiple resistance to the larvicides that were used, avoiding any negative impact on the environment, to develop a drug that would kill the parasites, and to hand control of residual responsibilities over to the beneficiary countries once the program ends.

Liese and his colleagues identify the main reasons for the program's success as:

- Limited, achievable, clearly defined objectives and a realistic 20-year timeframe. The request for a 20-year commitment did not meet with potential donors' immediate approval, but the proponents of the program remained firm in their assessment that this much time was necessary to eliminate the parasite reservoir in the human population.
- Use of the best technology available for any task.
- Contracting out highly specialized tasks such as aerial spraying.
- Operational research (considered an equal partner in program implementation).
- Program autonomy, which allowed flexibility in responding to strategic and technological issues.
- Delegation of authority to those most closely involved in the program, thus assuring a clear focus and flexibility.
- Long-range planning to sustain donor commitment.
- Transparency, made possible by a comprehensive flow of information and the program's openness to evaluation and review.

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THE ONCHOCERCIASIS CONTROL PROGRAM IN WEST AFRICA:  
A LONG-TERM COMMITMENT TO SUCCESS

Bernhard H. Liese, John Wilson, Bruce Benton and Douglas Marr

1. Development of health systems in West Africa has been fraught with difficulties for many years and most health services still fall far short of meeting basic needs. In most West African nations the paucity of human and financial resources, management capability, and political will has made lasting improvements difficult to achieve even when financial support from aid agencies such as the World Bank has been readily available. Some programs, however, have met with success despite these constraints. These are, in particular, programs which have been focused on one disease or a group of diseases. The Smallpox Eradication Program has been the classic example and the Expanded Program of Immunization has had a significant impact on five major diseases affecting children. The most notable recent example, however, is the Onchocerciasis Control Program (OCP) in West Africa. The OCP is recognized as a solid pillar of achievement among health development efforts and is considered by the donor community the most successful health program in West Africa. This paper reviews the OCP's experience with the objective of drawing more general lessons for the Bank's health and development work.

The Disease

2. Onchocerciasis has long been the cause of great human suffering across a wide part of Africa stretching westward from the Sudan to Senegal and southward to Malawi. Although not confined to it, the disease is most devastating in the drier sudan and guinea-savannah areas and is caused by a thread-like worm, Onchocerca volvulus which is spread by the bite of female blackflies (Simulium damnosum s.l.).<sup>1</sup> Victims of onchocerciasis experience severe debilitation and itching due to the proliferation of millions of infant worms produced by adult worms located in unsightly nodules under the skin. By the time victims are in their late twenties and have been repeatedly infected by the parasite, the result is impaired vision and often blindness. Although it is not a killer disease, onchocerciasis appears to reduce life expectancy and threatens the viability and very existence of entire communities. Since the blackflies which spread onchocerciasis breed in rivers, those villages located close to them are the most severely afflicted; hence the colloquial term "riverblindness".

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<sup>1</sup>Some of the several varieties of Simulium damnosum s.l. are more effective vectors than others. The species complex is divided into forest forms (S. soubrensi, S. sanctipauli and S. yahense), savannah forms (S. sirbanum and S. damnosum s.s.) and an intermediate variety S. squamosum. Control efforts concentrate on the savannah forms and S. squamosum since the forest forms do not appear to be responsible for blinding onchocerciasis.

### Economic Impact

3. The connection between life by the river and blinding onchocerciasis led to the virtual abandonment of many fertile river valleys. People crowded on to marginally productive lands plagued by over-farming, desertification and drought, while potentially productive lands have lain idle for many years. As transmission of the disease is possible anywhere within the very extensive flight range of the blackfly vector, moving out of these river valleys has not guaranteed protection from onchocerciasis; millions were still infected by the parasite. Many who would otherwise be at the peak of their productive lives found themselves unable to contribute adequately to the support of their families. Extended families or other villagers were forced to provide for those disabled by the disease. In the never-changing situation, new victims succumb to blindness and take the place of those who died, so maintaining the burden of this disease on the community.

### History of the Program

4. In the 1960s, the French scientific research organization, ORSTOM, operating in conjunction with the Organization de Cooperation et Coordination des Grandes Endemies (OCCGE), collected a large amount of data on onchocerciasis and the blackfly vector in western Burkina Faso, northern Côte d'Ivoire, and Mali. The World Health Organization (WHO), in an inter-country project supported by the United Nations Development Program (UNDP), gathered similar data from northern Ghana, eastern Burkina Faso and northern Togo. These studies confirmed that the Volta River Basin in West Africa was the largest contiguous focus of onchocerciasis in Africa and documented the devastating effect of onchocerciasis on the region's population and economy.

5. Following the positive outcome of a conference in 1968 deeming the control of onchocerciasis feasible, seven West African Governments--Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger, and Togo--requested, in 1969, WHO assistance in formulating the terms and conditions of an onchocerciasis control program. They clearly recognized that onchocerciasis was a major health problem in their savannah areas and that the disease was wreaking havoc among their rural populations who were debilitated, blinded and forced to abandon fertile river valleys. The governments of these countries were keenly aware that the blackfly vector did not respect political boundaries, and that independent national effort could not control onchocerciasis effectively. The costs and implications would exceed the capabilities of any one government and intercountry collaboration and donor assistance would be necessary.

6. In 1970, UNDP provided funding for a Pre-Assistance to Governments (PAG) Mission to the above seven countries, the report of which was presented to a meeting of potential donors in Paris in December 1973. The report concluded that effective onchocerciasis control could be achieved in savannah zones only if its endemic area were clearly delineated and if such control were intensive and sustained therein long enough to kill off the indigenous parasite. The PAG Mission report thus identified an area of 640,000 km<sup>2</sup> incorporating 18,000 km of rivers, to be kept under control for 20 years at an estimated cost of US\$120 million (at 1973 dollar value). Nine donors and agencies--Canada, France, the Federal Republic of Germany, Netherlands, the United Kingdom, the

United States of America, UNDP, the World Bank, and WHO then pledged their commitment to the Onchocerciasis Control Program which was launched in January 1974.

7. The Bank has played a vital role in the implementation of the OCP from the outset. Its participation began in 1972 when Robert McNamara, then President of the World Bank, visited West Africa and was so concerned about the dreadful impact of onchocerciasis on entire communities that he promptly convened a meeting in London with the heads of UNDP, the Food and Agricultural Organization (FAO), and WHO to consider what might be done with regard to the control of the disease and the subsequent development of the river valleys. A Steering Committee was consequently established in 1973, composed of representatives from each of the above agencies, whose mandate was to guide the development of a program. The Steering Committee gave support to the PAG Mission and helped to establish the structure of the program. The Bank also made an important contribution to strengthening the management of the program, in its early years, by seconding one of its senior staff to assume the position of Director of OCP for a period of three years.

8. Since then, the OCP has doubled its operational area to cover 1.3 million km<sup>2</sup> and 50,000 km of rivers. It has incorporated four more countries: Guinea, Guinea Bissau, Senegal and Sierra Leone; and it has attracted a further 15 donors: the African Development Bank, Belgium, the European Economic Community, Finland, the Gulbenkian Foundation, Italy, Japan, the Republic of Korea, Kuwait, Luxembourg, Norway, the OPEC Fund for International Development, Portugal, Saudi Arabia, and Switzerland, to support an annual budget of approximately US\$30 million. Complete operational coverage of this enlarged program area was achieved in 1990.

9. Today the program is an acknowledged success. Ninety percent of the original area is virtually free of onchocerciasis. The population is no longer debilitated from the disease. To date blindness has been prevented in over 100,000 people, and 9 million children born in the area since 1974 are no longer at risk of contracting the disease. Vector control activities throughout 90% of the original area have been halted since the risk of recrudescence of onchocerciasis is now negligible. Moreover, fertile river valleys have been opened up for socioeconomic development and new communities are being established along rivers where previously people would have been exposed to the worst ravages of the disease. National governments can now confidently promote farming and agroindustry in these areas, supplanting dependency with surplus production. Already, previously deserted lands are the site of thriving plantations producing sugar, tea, cotton, rice and other food and export crops.

#### The Onchocerciasis Control Strategy

10. From the beginning, the program has maintained a limited and specific objective: to control onchocerciasis in a clearly delineated area in the savannah zones of West Africa. This objective was initially linked to the socioeconomic development of the area and, later, to the development of the capability in the health sector in each of the Participating Countries to maintain onchocerciasis control. However, these considerations have not been

allowed to detract from the principal goal of the program to achieve onchocerciasis control.

11. In the absence of a suitable drug or vaccine, the operational focus of the OCP has been to interrupt onchocerciasis transmission leading to the eventual elimination of the parasite. The PAG mission report confirmed that the only acceptable approach was the effective control of the blackflies that transmit the disease. With a flight range that exceeds 300 km, the adult blackflies disperse too widely and are not targetable. As a result, the strategy has of necessity focused on blackfly larvae whose locations are identifiable. The blackfly breeding sites are not hard to find since the females deposit eggs only in fast-flowing parts of rivers and streams. For the 8-to-10-day period when the larvae are developing in the water, they can be killed by larvicide. The weekly application of larvicide upstream of breeding sites<sup>2</sup> has been the basic control strategy of the OCP and it has remained unchanged since the program began.

12. Because of the length of river (between 5,000-30,000 miles) which has to be covered on a weekly basis and the inability to reach all the breeding sites during all seasons by road, ground treatment has proven inadequate and ineffective against *S. gambosum*. The program has, therefore, had to employ aircraft to obtain the necessary coverage. This is often dangerous, since many of the targets are along winding and narrow watercourses, and both helicopters and fixed wing aircraft with highly skilled pilots must be used. The aerial spraying has therefore been contracted out to private, specialized firms. This singular method of vector control is the most cost-effective technology for OCP. One helicopter can do in one hour what a highly trained ground application team could not achieve in a week. The operations are sophisticated, currently engaging up to 11 helicopters and two fixed wing aircraft, and require a high degree of coordination between the aerial spraying team and the program staff who determine when, where and how much the pilots are to spray. This coordination of larviciding activities is the responsibility of OCP. Deployment of the aircraft depends on the weekly collection and analysis of data on the quantity and location of breeding sites, on water levels and water discharge (which affect the quantities of larvicide to be applied), and on the effectiveness of the previous week's application of larvicide. The program must ensure that the fuel and pesticide depots are regularly replenished throughout the program area. It must also monitor the size of the biting blackfly population, and periodically measure the level of infection in the human population.

13. The lifeline of the system is a radio network. This network links the information-gathering field offices throughout the program area to the two operations centers--in Bamako, Mali in the west and in Kara, Togo in the east

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<sup>2</sup> The blackfly eggs are deposited on to stems and rocks just below the water surface; within two days they hatch and the larvae again attach to substrates in the water. The larvae filter small particles from the water that pass through their digestive system. At this stage, any larvicide particles introduced into the stream are trapped in the filter fans and pass into the gut killing the larvae.

--which deploy the aerial spraying fleet. The radio network also enables the Program Headquarters in Ouagadougou, Burkina Faso, to maintain contact with all aspects of operations. The location of targets for spraying is determined by mobile teams supervised by entomologists which capture the blackflies for analysis of their numbers and their potential to transmit onchocerciasis. This information, together with water levels taken in river gorges, is relayed by radio from subsector to sector offices and from there to the operations centers where the maps to guide the pilots in their weekly circuit of spraying are prepared.

14. Measurement of the impact of blackfly control on onchocerciasis in the village populations is carried out by three medical and ophthalmological teams which monitor the level of infection in a large sample of communities throughout the program area. A sample of villages is visited on rotation every three years to plot the change in disease patterns over time. This indicates when populations are or will be free of the disease or if there are some impediments to progress.

#### The Program Structure

15. Because of their inability to undertake effective control of onchocerciasis on a national level, the Participating Governments, through signed Memoranda of Agreement, gave OCP the mandate to carry out the control operations throughout the delineated area on their behalf.

16. The OCP was formally set up with its own independent structure with WHO as executing agency, and the Bank as fiscal agency responsible for all fund-raising. However, the governing body of the OCP is the Joint Program Committee (JPC) comprised of representatives from the Participating Countries, the Sponsoring Agencies, and the donors. The JPC, which has its own terms of reference approved by all members including the Bank and WHO, ensures the implementation of OCP policy and approves budgets. A critical feature of the JPC is its functional independence from WHO and WHO's governing bodies, i.e. the World Health Assembly and the WHO Executive Board; it is thus not distracted or influenced by the political priorities of WHO. This was particularly important in the early years of the program when OCP's vertical approach towards combatting a single disease was at divergence with WHO's multivalent primary health care policy.

17. The day-to-day steering and coordination of the OCP is delegated by the JPC to the Committee of Sponsoring Agencies (CSA) (the successor to the Steering Committee) which meets several times during the year. Within the CSA, the principal actors are the World Bank and WHO because of the critical roles they play in the program's implementation as fiscal and executing agencies, respectively. It is the CSA which actually follows the program most closely, guiding policy development, reviewing plans and programs, maintaining short-term financial control, and monitoring overall implementation of the program between annual sessions of the JPC. The OCP Director, therefore, has several opportunities during the year to report on the program and to seek guidance in resolving operational or financial problems. Also, problem solving and preparation for CSA meetings has been facilitated by regular contact and flow of information between the Program Director's liaison officer

in Geneva, who is also the Secretary of the CSA, and the Bank's representative in Washington, D.C.

18. As Executing Agency for the Program, WHO carries out the action plans and strategies approved by the JPC. WHO, in consultation with the CSA, appoints the OCP Program Director who reports directly to the JPC. Having been delegated full responsibility for OCP by the Director General of WHO, he has relative freedom and independence of action within WHO on matters pertaining to the program. WHO itself provides technical, administrative and legal assistance in such areas as larvicide development and selection, drug screening, hiring and procurement. As the Fiscal Agent for the program, the World Bank manages the Onchocerciasis Trust Fund, which constitutes all donor contributions, and disburses OCP funds on a quarterly basis through WHO. In addition to contributing from its own account, the World Bank is responsible for mobilizing financial resources from the donor community. The separation of executing and fiscal responsibilities is a feature of the program that deserves special notice. It opened up sources of financing not normally available to WHO, and most importantly, it avoided conflict between WHO's regional or global priorities and the needs of the program. In addition, the fiscal arrangements permitted an ongoing external control on expenditures by the World Bank as a representative of the donors and as a member of the CSA.

19. The program structure also includes two very important independent statutory review bodies which report directly to the JPC. First, a twelve-member Expert Advisory Committee (EAC) audits the scientific and technical aspects of the program. Second, a five-member Ecological Group (EG) monitors the impact of larvicide used in vector control on the riverine ecology and advises on the selection of new insecticide products. The members of these two bodies, which meet formally once a year in the program area, are individuals of international repute. They are selected by the CSA and appointed by WHO for a two-year period without prejudice to re-selection. Both groups have played a critical role in OCP, since its inception, by recommending or endorsing important modifications in program operations. Their views are highly respected by the JPC in helping that governing body reach important decisions.

20. Finally, in each of the Participating Countries, a National Onchocerciasis Committee (NOC) coordinates local OCP activities and provides practical assistance to field operations. The Participating Countries have committed to pay up to 1.4% of program expenditures in cash contributions or to provide the required national staff for the operations in their country. In the latter case the Participating Governments are forced to be more closely involved in OCP but full management responsibility is retained by OCP which provides a salary supplement and per diem to the staff concerned. In addition, the NOCs have held joint annual meetings that have proven to be an important and productive forum for discussion of shared problems resulting from the program's activities and success. Likewise the donors meet periodically in seminars hosted by the Bank to review matters of common interest related to the ongoing financial support to the OCP.

21. The program has been implemented in six-year financial phases, each with separate projected costs formally approved by the JPC and supported by Fund



Agreements signed by the donors. The Memorandum of Agreement incorporated within the Fund Agreements<sup>3</sup> is also signed by the Participating Governments. In addition, the program prepares annual budgets that must be presented for approval at the annual meetings of the JPC. By the end of 1989, program expenditures amounted to US\$282 million to which the Bank had contributed US\$28 million through the Special Grant Program.

### Major Challenges

22. The successes of OCP have not been achieved without several challenges having to be met and addressed at different period of its implementation. The major challenges have been "reinvansion", resistance to larvicide, monitoring OCP's environmental impact, the development of a curative drug and the handing over of maintenance activities to the Participating Governments ("devolution").

23. Blackfly Reinvansion and Extension of the Program. From the start, reinvansion of blackflies emanating from source rivers outside the original program area has presented a problem in controlled areas. About 10% of the original program area, primarily along its periphery, was affected in this way. A significant percentage of these incoming flies carried O. volvulus worms and thus reintroduced new infection to the reinvaded area. As the overall attainment of program objectives was clearly threatened, the only effective solution was to extend the spraying operations to incorporate the river sources of these blackflies. In 1978, a minor extension of spraying into southern Côte d'Ivoire had some impact in this regard but a major extension of spraying was recognized as being necessary and was recommended in 1981 by an Independent Commission that was established to review the program. Based on OCP studies in southern Ghana, Togo, and Benin and by similar WHO (and later OCP) studies in Guinea, Guinea Bissau, western Mali, Senegal and Sierra Leone, the program prepared a Long Term Strategy Paper that established the cost-effectiveness of extending the program in order to preserve its achievements. Although approved by the JPC for the third financial phase beginning in 1986, implementation of spraying operations in the Western and Southern Extensions was considerably delayed because of a flare-up of resistance to the key larvicide. The EG, supported by the EAC, placed an immediate embargo on any extension to the operational area until the OCP had at least three back-up larvicides to temephos (the product presently used), each of which was operationally viable and environmentally acceptable. When this condition was met and approval given by the JPC, spraying eventually started in the Extension areas and full coverage of the total Extension areas was realized in 1990. This now means that the program's objective throughout the Western Extension area will be attained only by 2004 when spraying operations can be safely stopped.

24. Combatting Blackfly Resistance to Larvicide. Anticipating eventual development of resistance to temephos, OCP began identification and testing of

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<sup>3</sup> The institutional provisions and arrangements (including minimum pledges of financial support) for the execution of the program were contained in the Onchocerciasis Fund Agreements (1974, 1979, and 1986)

alternative larvicides early on in the program. This was undertaken with the full support and encouragement of the EAC, and a monitoring system for early detection of resistance was set in place. Resistance to temephos first emerged in 1980 but was for many years confined to an isolated part of southern Côte d'Ivoire. Chlorphoxim was then introduced as a replacement, and then, soon after, came Bacillus thuringiensis (B.t. H-14). The different characteristics of B.t. H-14, especially in the formulation originally available, required appropriate modifications to the type of spraying equipment used. It also required the contracting of a larger helicopter at considerably increased cost to the program. In 1987, the resistance erupted and expanded rapidly from Côte d'Ivoire to Mali and to the Western Extension area where operations were just getting underway. The Ecological Group and Expert Advisory Committee reviewed the situation and placed their embargo on further extension of operations. Because of the special formulations required to treat rivers and achieve maximum blackfly control with minimum environmental impact, the program intensified its collaboration with the insecticide industry and its field testing of new products. Chemical companies responded positively and this collaboration led to improved formulations of B.t. H-14 which could be applied with the aircraft already available in the fleet and in the identification of new larvicide, including permethrin and carbosulfan. Today, the OCP uses six compounds, all approved by the Expert Advisory Committee and the Ecological Group. These are applied in a rotational scheme which lessens the risk of blackfly resistance.

25. Monitoring the Environmental Impact. The program was conceived at a time when the use of insecticides was highly suspect following the publication of a number of very critical articles on the use and misuse of DDT. It was important, therefore, that the OCP, from the outset, ensure that larviciding would not adversely affect the aquatic fauna and flora. Some donors indicated their inability to support the program should such protective mechanisms not be incorporated. Accordingly, an independent Ecological Group (EG) was set up and was already functioning in 1973, before the program officially began. Because of its independent nature, this EG has been able to assuage any donor and international concerns about the environment and to ensure that OCP continues on an environmentally sensitive path.

26. The EG played a vital role from the start in drawing up protocols for monitoring the treated rivers and streams. These protocols have formed the basis for the continued review of the impact of larvicide application. All data collected are presented to the EG for independent assessment. No new product can be introduced to the operations without the clearance of the EG. More recently, with the use of several different larvicides in rotation, the EG has paid particular attention to possible synergistic effects or any other interrelationships among the various products used. This independent ecological oversight has enabled the program to continue larviciding without adverse ecological impact for over 16 years and thus maintain a clean bill of environmental health.

27. Chemotherapy. The possibility of introducing alternative methods of control to complement larviciding has always been a desired objective of OCP. It has been hoped that chemotherapy could someday replace larviciding as the principal means of control. This depends, however, on the development of an

effective macrofilaricide (i.e., a drug that would kill the adult worms in the human body) suitable for mass treatment. The Independent Commission which evaluated the program in 1981, recommended greater emphasis be placed on drug development since it deemed that such a drug was necessary for the continued success of OCP. Subsequently, the Onchocerciasis Chemotherapy Project (OCT) was set up in 1983. This was necessary as an adjunct to the WHO/UNDP/World Bank-sponsored Special Program for Research and Training in Tropical Diseases (TDR) to augment the limited funds it could provide from its budget for this specific purpose. OCT has collaborated with industry and research institutions in the testing of thousands of potential products in the search for such a drug. To date no acceptable macrofilaricide has been found, but the efforts of OCT have led to the discovery of ivermectin, an effective, long-acting microfilaricide, (i.e. it kills off the infant worms in the skin).

28. Ivermectin was a drug developed by Merck, Sharp and Dohme to treat parasites in animals. Its effectiveness in humans was established through clinical trials carried out by OCT in collaboration with TDR. While ivermectin does not kill the adult parasite, and kills only the microfilariae, it does so without the most unpleasant and distressing side effects of diethylcarbamazine (DEC), a multidose drug available for years but unsuitable for mass treatment. As a bonus, ivermectin also inhibits, for reasons unknown, the production of further microfilariae by the adult female worm for about 12 months.

29. Initially, expectations were high that ivermectin could be used as a control tool by itself, if adequate, population-wide distribution could be organized, but field trials have shown that the once-per-year treatment leaves about 5% microfilariae infection, enough to allow continued transmission of the disease. While thus not a suitable control tool, ivermectin is most effective in relieving suffering and preventing blindness caused by the disease. The program began large-scale ivermectin distribution in heavily infected villages in the Extension areas which resulted in the above observations being made in 1988. The drug is being donated by the manufacturer for as long as it will be required so as to encourage its use. Although the drug is free, the costs of its distribution and monitoring its effect are considerable. While presently these are borne by the program in addition to the larviciding costs, they will eventually have to be transferred to the national governments. Despite its benefits, ivermectin is not the final answer to the program's needs and the search for a macrofilaricide continues.

#### Devolution and the Role of the Participating Countries

30. With complete responsibility for the control operations vested in OCP, the Participating Governments have played a relatively minor role. As a result there has been no provision within their health systems and in their overstretched budgets for the establishment of a structure, properly staffed, equipped and financed, to enable them to take over when OCP is eventually wound up. This weakness was identified by the Independent Commission as early as 1981 when, in its report, it flagged the eventual devolution of maintenance activities to the Participating Countries as an essential prerequisite to the successful conclusion of the OCP. Since then, devolution has been of major

concern of the JPC. It may be defined in terms of preventing onchocerciasis recrudescence in the program area through two activities: (i) epidemiological surveillance and (ii) focal treatment with ivermectin or another drug, should it become available, of new cases when these are identified.

31. For some years, OCP has struggled to put devolution into an operational framework. Initially, there was no tool (or strategy) available that the countries could employ on their own should there be a recrudescence of the disease. It also became evident that it made more sense to defer devolution of responsibility until, through the efforts of OCP, the level of onchocerciasis became such that the risk of its recrudescence was negligible. This was necessary since, to be effective, larviciding must be international in coverage and only the OCP itself was equipped to undertake vector control operations on such a scale. Now, encouragement is being given to the countries to develop what is necessary for them to maintain the achievements of the OCP after the larviciding program ceases and so prevent recrudescence. The recent introduction of ivermectin has provided the countries with a tool to treat new cases of the disease. As mentioned above, although ivermectin is not proven as a control mechanism on its own, properly administered, it should keep the disease at bay. Seven countries where onchocerciasis is now well under control, Burkina Faso, Benin, Côte d'Ivoire, Ghana, Mali and Niger, and Togo have thus far prepared first step devolution plans. Technical support will be provided by the OCP to implement these plans.

32. Meanwhile, to try to overcome this hurdle towards devolution, the OCP has involved the Participating Country governments in the Western Extension area in other constructive ways. From the outset all staff engaged in the OCP, whether national or expatriate, have been employees of WHO. This was modified in 1986 in the extension countries where staff were seconded to OCP but received a supplementary payment and per diem from the program. The national governments in the extension area now provide the personnel necessary to staff the entomological sector offices and the mobile teams involved in blackfly surveys. These governments are also participating fully in the ivermectin distribution program.

#### Reasons for Success

33. Clearly Defined Objectives and Timeframe. The most important lesson from the OCP experience is that a limited and realistic objective, unambiguously defined, and shared equally by program staff, beneficiaries, donors and sponsors, is a precondition for success. Such an objective gives the program a clear mandate and the legitimacy to pursue it. A mandate of this nature should not be equated with a narrowly defined operational strategy. While the OCP, for example, uses larviciding as its principal control tool, larviciding per se has never become the program's objective. Larviciding was never confused with onchocerciasis control. The latter point is especially important since many other health programs and other targeted development efforts have confused ends and means -- with poor results. Malaria control programs, for example, set out to control malaria but soon became extremely rigid DDT spraying programs which later proved unable to adapt to changing epidemiological or fiscal conditions.

34. The OCP has been guided throughout by technical considerations and not by political pressures. This was exemplified in 1986 when Côte d'Ivoire made a strong plea to have the OCP area extended to control onchocerciasis in the forest area. The EAC examined the situation in 1987 and reported to the JPC later that year that OCP's mandate was control of the blinding form of onchocerciasis in the savannah areas and such an extension was not justified. Despite further pleas by Côte d'Ivoire, the EAC maintained its advice to the JPC, which enabled the JPC to make a definitive decision not to extend operations, thus saving the program from both operational and financial difficulties. Such single-mindedness of purpose has been a critical dimension in the successful implementation and day to day management of the program.

35. The OCP and the donors agreed at the beginning of the program on a realistic timeframe for achievement of program objectives. The request for a 20-year commitment by the donors was unprecedented and did not meet with the immediate approval of potential donors. Nonetheless, the proponents of the program remained firm in their assessment that this timeframe was appropriate and realistic based on epidemiological facts (principally the then conceived 15 to 18 year lifespan of the adult worm).

36. Choice of Technology. Part of the program's success can be attributed to its conscientious pursuit of the best technology available for any task. Consequently, aircraft have been used to apply larvicide and, more recently, water level data have been transmitted using state of the art methods via satellite enabling more accurate spraying levels so reducing environmental risk. Computer modelling of onchocerciasis transmission has been developed and is used in forecasting the progress of operations. Chromosome reading was introduced to identify species of the S. damnosum complex more efficiently and the separation of vector and non-vector species. This reliance on the most advanced tools available has helped maintain the cost-efficiency of operations.

37. Contracting Out Highly Specialized Tasks. Another lesson which is of broader interest concerns the contracting out of highly specialized operations. Aerial spraying operations, the key element in the OCP strategy, were contracted out to private companies uniquely qualified for the task. The OCP accepted early on that it lacked the expertise to undertake such a large and complex spraying effort involving a fleet of helicopters and sophisticated spraying equipment. OCP did not make the mistake that many public agencies have made -- of feeling obliged to undertake tasks considered critical to achieving program objectives with in-house staff under their direct control. It realized that it could better maintain control and demand a higher level of quality if this critical task were contracted out to a highly specialized and qualified firm.

38. Operational Research. OCP, throughout its existence, has spent about 15% of its budget on operational research which has always been considered an equal partner in program implementation. By undertaking such operations-related research, OCP has constantly improved its control technology and has even generated new control tools. It has led to the creation of a special drug development fund to seek a specific drug (a macrofilaricide suitable for mass treatment) which would interrupt onchocerciasis transmission. This

operational research has not only increased the program's efficiency and reduced costs (for example, satellite transmission of data on accurate water discharge) but has ensured survival of the program when critical technical challenges arose (for example, rapid spread of resistance). Therefore, emphasis on operational research has greatly facilitated the program's adaptation to new situations.

39. New larvicides, as soon as they were approved by the Ecological Group, were incorporated in the OCP arsenal; susceptibility testing became routine for signalling when resistance was appearing, and a change of product was called for; new techniques for identifying adults and larvae of the blackfly species were immediately exploited to target the important vectors; improved larvicide application equipment developed by the program was incorporated in the bid documents of new aerial contracts; methods of distinguishing forest from savannah types of onchocerciasis parasites are being sought to enable a more effective demarcation of the program area; a mathematical model of onchocerciasis has reached an advanced state of development enabling predictions to be made of the long-term impact of both vector and chemotherapy control and the risks of recrudescence.

40. Autonomy of the Program. The program was set up with a high degree of autonomy from the Sponsoring Agencies. Specifically, while WHO is the executing agency for the program, the OCP has never come under the direct jurisdiction of the World Health Assembly or the WHO Executive Board. Its special position has enabled it to overcome many of the administrative procedures of WHO that might have hampered implementation or brought it into competition with other health priorities of WHO. A highly specialized program such as OCP, is very different in nature from the horizontally organized Primary Health Care programs which have been promoted by WHO over the last decade. Also in this way WHO, itself a donor to the Special Fund, is effectively a co-sponsor of the program and does not charge the usual 14% agency administration fee which would normally apply.

41. The Program Director, having been delegated full responsibility for OCP matters by the Director-General of WHO, reports directly to the JPC for matters concerning the program. The program's autonomy has enabled it to adjust operations quickly as circumstances dictate. The autonomy of the OCP has proven especially important given the fact that it has been implemented during a time when attention to tropical diseases has declined vis-a-vis other important health concerns.

42. The program has been kept on track by its own in-built system of checks and balances--which in the OCP's case provided by the EAC and the EG. These bodies act as technical auditors and periodically provide objective reassurance to supporters that continued commitment is justified; they also help determine and legitimize any mid-course corrections that become necessary. The EAC and EG produce detailed scientific documents which are a staple of the annual JPC meetings. The credibility generated by this open flow of information has helped maintain donor support. There is also the financial auditing of the program which is carried out annually by both the internal and external auditors of WHO, who have been very constructive and laudatory in their comments on OCP. As fiscal agent, the Bank, on its own and

through the CSA also maintains a financial brief on the Program's operations and expenditures on behalf of the JPC.

43. Governance of the Program. Delegation of authority to those most closely involved in the program has been crucial to assuring its ongoing success. The CSA, which meets three to four times per year, has proven a useful, persistent referee of the OCP since the beginning. The delegation of responsibility for policy development and financial supervision to the CSA has enabled crucial decisions to be taken between annual meetings of the JPC. The JPC mandated the CSA to approve overruns on the budget of up to 10% in any one year, to meet unforeseen expenditures. Such overruns were possible because of the reserve held in the Trust Fund. The CSA supported the Bank in its efforts to obtain approval for a prescribed contingency reserve held in the Trust Fund to meet any emergency and to carry over the OCP from one financial phase to the next. The CSA was also given responsibility for following socioeconomic development of the area and, through the Bank, has been instrumental in fielding a number of specific studies. Overall the CSA has played a major role in ensuring that the program meets its objective by responding in a timely fashion to changing operational and financial requirements and in providing independent support when necessary.

44. Through the delegation of responsibility to him, the Program Director has direct access to the CSA as well as to the donors and to the Participating Country governments. At the national level, the Presidents of each of the Participating Countries appointed National Onchocerciasis Committees to resolve problems related to the program so that decisions can be made quickly to avoid operational delays. The independence of the EAC and the EG has enabled them to play an important role in influencing the governance of the program and has prevented technical issues from being viewed politically, a very necessary control in such a multicountry program.

45. Overall, this delegation of authority throughout the program has allowed a continuity of governance by selecting individuals devoted to the program's objectives and has ensured that a clear focus has been maintained year after year. It has also permitted a necessary degree of flexibility that has made it possible to respond in a timely and effective manner to strategic and technological problems.

46. Medium-Term Planning and Sustained Donor Commitment. In 1973, the PAG mission report made it clear that success would depend on a minimum 20-year financial commitment. Faced with the difficulty of sustaining donor support over such a long period, the program was divided into a series of medium-term planning phases. For each of these six year periods, the program prepared a detailed plan of operations outlining the objectives to be reached during that period, any modifications necessary and the estimated cost of the operations. Based on these plans approved by the JPC, the donors adjusted the level of their pledges for the period. At the start of each of the six-year financial phases these revised pledges were incorporated in a new Trust Fund Agreement signed by the donors. The Memorandum of Agreement which became an integral part of the Trust Fund Agreement was signed by the Participating Governments. These Fund Agreements have disallowed earmarking, thus permitting a high degree of flexibility in financial management of the program. In this regard,

at its scheduled meetings, the JPC has the opportunity to review any modifications detailed in annual budgets supported by Plans of Action submitted for approval. These Agreements, based on approved Plans of Operations, on the one hand tie the program into what it has to accomplish in the six year period and, on the other, obligate the donors to an agreed level of financial support for the same period and the Participating Countries to their responsibilities. They have been crucial to ensuring the successful evolution of the OCP and could provide a model for other programs involving long term commitments and cooperation between a number of donors, agencies and governments.

47. Transparency - Information Flow. The program has benefited greatly from the transparency achieved by maintaining an unrestricted flow of information about the program amongst all parties involved. It has also benefitted from its own openness to inspection and review. The program has undergone annual technical audits by the EAC which has reported its findings in frank annual reports to the JPC. The OCP itself provides a detailed progress report to each JPC meeting (both verbal and written) which covers technical, policy and financial issues. The OCP openly welcomed the Independent Commission review in 1981, the USAID Review Group review in 1985 and an Independent External Review requested by the donors in 1990. This statutory reporting system is augmented by regular visits to the donors by combined Bank/OCP missions and by the OCP to the Participating Countries. Throughout, difficulties have been openly and candidly debated; this transparency has been greatly appreciated by all parties concerned. This openness has played no small role in maintaining the confidence of an ever-increasing group of donors and has helped ensure the continual financing of the program. Confidence in the program has also encouraged Participating Countries to maintain their annual 1.4% contribution to OCP.



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